

## AMENDMENTS TO THE CLAIMS

This listing will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

Claim 1 (currently amended): A device for checking a logical software engines engine for controlling and commanding ~~plants, particularly railway plants, particularly station plants, a~~ plant, the device comprising:

at least a computer ~~with~~ having at least a central processing unit and at least a memory for loading and executing programs[[:]];:

a logical engine for commanding ~~a the plant, particularly a station plant, the logical~~ engine being loaded or loadable in said the at least a memory for its the execution, of the logical engine, the logical engine providing control and command signals;

~~which plant comprises a plurality of operating units for capable of actuating and/or detection and/or measurement and/or signalling, so-called wayside equipments, detecting, measuring, and signaling, which the plurality of operating units are being further capable of provided for receiving command signals and for of transmitting control signals about the operating condition of the plant, and which the logical software engine reads reading the control signals given provided by the plurality of operating units for actuating and/or detection and/or measurement and/or signalling and it processes and processing the command signals of said operating units basing on according to an operation protocol of the plant itself,~~

~~characterised in that~~

~~in the computer memory wherein a plant software-simulation program software is stored in the memory,~~

wherein the plant simulation software is designed that is to be controlled and commanded by the control and command logical program is loaded or logical engine,

wherein the plant simulation software is loadable and it is executable by the at least a computer itself and which, and

wherein the plant software simulation program reproduces exactly simulates accurately the plant structure and the operating modes of the plurality of operating units provided in said plant.

Claim 2 (currently amended): ~~[[A]] The device according to claim 1, characterised in that the simulation of plant structure and of operating units associated thereto, such as track circuits to detect the presence of the train, switch points actuators, signalling actuators and other different units is represented in the simulation program by~~ wherein the plant simulation software comprises Boolean algorithms including variables, and wherein the variables associated to said algorithms being are univocally defined to represent the control signals of various state or operation different state and operating conditions of several the plurality of operating units, and the command signals for commutating and/or and maintaining the different state or and operating conditions of said several the plurality of operating units.

Claim 3 (currently amended): ~~[[A]] The device according to claims 1 or 2, characterised in that claim 1, further comprising means for displaying the an image of plant behaviour are provided under the control of the control and command logical program behavior, wherein the means for displaying are controlled by the logical engine as variable lists univocally associated to various the plurality of operating units as report files wherein various, and wherein the report files list one or more of the plurality of operating units and the associated state [[or]] and command variables are listed.~~

Claim 4 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that the claim 1, wherein the plant simulation program software comprises means for setting starting operating conditions of the plant and/or even anomalous~~

setting and means for simulating anomalous situations of plant operating units, in order to check the reaction of the plant to these conditions the anomalous situations.

Claim 5 (currently amended): [[A]] The device according to one or more of the preceding claims, characterised in that to claim 1,

each wherein a plant component is one of the plurality of plant operating unit and/or to each important structural units, a predetermined element of the plant, and/or at least to one or more areas a predetermined area of the plant, and/or to or the whole plant,

wherein each plant component can be univocally associated to a virtual image of the operating unit and/or of the plant structural element and/or of the area or areas of the plant and/or of the whole plant which,

wherein the virtual image is generated by a graphic program loaded or loadable and/or and executable by the one of the at least a computer of the device and which,

wherein the virtual image is univocally correlated to the logical program for simulating the operating unit or the plant structural element or the area or areas of the plant or the whole plant engine,

wherein the graphic program for generating the virtual image of each operating unit and/or of each area and/or of the plant being such to generate is capable of generating several graphic aspect conditions of the operating unit, of the area or of the whole each plant component, and

wherein each of them plant component is univocally correlated to a predetermined value of a variable variables relevant to the operating condition of the operating unit or of the area or of the plant and/or plant component and of a command variables variable for commutating or maintaining managing the operating state of the operating unit or of the area or of the plant component.

Claim 6 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that~~ claim 5, further comprising a first program for simulating a relay operation and a second program for simulating a relay network operation, further comprising and graphic programs for representing relays univocally associated to the first program for simulating relay operation and to the second program for simulating relay network operation, wherein the operation of the control and command logical program logical engine is further represented, in parallel or alternatively, as behaviour of the as an equivalent command hardware logic composed of comprising a relay network, a program for simulating relay operation and a program for simulating relay network operation being provided, as well as graphic programs for representing relays univocally associated to each relay simulation program and to relay network graphic representation program.

Claim 7 (currently amended): ~~[[A]] The device according to claim 6, characterised in that~~ wherein each relay in the relay network is simulated by a logical program of Boolean type, wherein the relay network provides relay and commutation commands, wherein single state conditions of relays and/or the relay and commutation commands being are represented by state or and command variables, and wherein the graphic programs for representing relays are being such as to associate several relay graphic aspects that are univocally correlated to values assumed by said state or and command variables.

Claim 8 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that it has~~ claim 6, further comprising means for scheduling and configuring images and/or and state and command variable lists of virtual operating units corresponding to the desired or correct operation or operational and state condition of the plant in conjunction with a predetermined operation situation, by providing wherein means are provided for checking, directly and visually, a correct operation of the virtual operating units, in conjunction with wherein automatic check means are further provided basing on the comparison between comparing one or more of a predetermined the nominal image, a and the nominal table, and a or list of desired state and command variables previously scheduled and the in a virtual model of the plant with one or more of an image, a table, and state and command variables really

that are actually processed during the operation of the ~~control and command logic~~ logical engine with the station plant virtual model, an error message being sent in case of non-identity.

Claim 9 (currently amended): ~~[[A]] The device according to claim 8, characterised in that it has further comprising~~ means for displaying graphically ~~and/or~~ and analytically ~~the~~ which operating ~~unit or units that have assumed a non-correct condition,~~ and the corresponding state ~~or~~ and command ~~variable or variables.~~

Claim 10 (currently amended): ~~[[A]] The device according to claims 8 or 9, characterised in that, wherein~~ the automatic check means ~~analyse even~~ are capable of analyzing the simulated representation ~~means of the relay network, indicating which relay or relays have not been~~ commutated in the correct condition and the corresponding commutation state ~~or~~ and command variables.

Claim 11 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that it provides automatic~~ claim 8, further comprising means ~~that correct the control and command logical program basing on the~~ for automatically correcting the logical engine according to possible corrections made by ~~the~~ a user to ~~the~~ state or and commands variables, ~~the state and command variables being manually modified in the presence of because~~ of a state or and command error of one or more of a virtual operating unit or of and a relay in the within a corresponding command logical circuit formed by the plant or network relay situated in a virtual model of the plant and relay network.

Claim 12 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that the~~ claim 8, wherein modification means ~~allow~~ provide modification interventions both of alphanumeric type, which modification interventions are executed on report files of state ~~or~~ and command variables, and aspect interventions for graphically modifying the aspect of ~~the~~ an operating unit ~~or~~ and the relay, which aspect interventions correspond ~~corresponding~~ to the state of said operating unit ~~or~~ and of said relay, ~~whereas analyse and wherein analysis and interpretation means are provided which~~ analyse analyze state ~~or~~ and command variable values that are manually set to correct ~~the~~ any

wrong values, ~~analyse the control and command logical program~~ analyze the logical engine, and modify the logical engine's code to commute ~~the an~~ operating unit ~~or and a relay in~~ to the correct state condition, when ~~the operation an~~ operating condition occurs ~~with which~~ due to which the ~~control and command logical program~~ logical engine had previously generated the ~~an~~ error signal.

Claim 13 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that it comprises~~ claim 8, further comprising a Boolean simulation program simulating plant operations, further comprising means for associating operating units and plant structural elements so to generate or and to find areas of the virtual station plant and further find the corresponding parts of the control and command logical program logical engine having typical that have plant structures components that recur in several station a plurality of plants, and so as to load and reuse in new plants having equal components both the Boolean simulation programs program, and the graphic display programs program, and as well as parts of control and command logical programs the logical engine in new station plants having equal station areas.

Claim 14 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that it has~~ claim 1, further comprising means for connecting and interfacing with a validation and certification means system that is based on the diversity of the program for generating the control and command logical program, such as a so-called Boolean algorithms checker a system different from the logical engine for generating command and control signals.

Claim 15 (currently amended): ~~[[A]] The device according to claim 14, characterised in that the Boolean checker wherein the validation and certification system comprises an additional program for generating the control and command logical program generated or memorized in the Boolean checker signals generated and memorized in the validation and certification system, which wherein the additional control and command logical program is generated through means different than the one during the test step by means of from the plant simulation software, and~~

~~are wherein means for comparing the additional control and command logical program generated or memorized in the Boolean checker with the control and command logical program during the test step by means of plant simulation to notice the identity between the two control and command logical programs~~ the additional program and the plant simulation software are compared so to verify that the additional program and the plant simulation software are identical.

Claim 16 (currently amended): ~~[[A]] The device according to claim 15, characterised in that wherein the additional program and the plant simulation software each comprise a Boolean equation system, -and wherein the additional program and the plant simulation software are compared by comparing the comparison occurs at the Boolean equation system of the control and command logical program generated or memorized in the Boolean checker and at the control and command logical program~~ the additional program and the plant simulation software during the test step by means of simulation of the plant.

Claim 17 (currently amended): ~~[[A]] The device according to claims 15 or 16, characterised in that the comparison occurs according to text reports by means of plant simulation of the control and command logical program during the test step and of the additional control and command logical program generated and/or memorized in the Boolean checker means being provided means for, , wherein the additional program and the plant simulation software are compared by comparing command and state variables of operating units and relays of the virtual relay network, both from the numeric perspective numerically and the graphic perspective graphically.~~

Claim 18 (currently amended): ~~[[A]] The device according to claim 17, characterised in that it comprises further comprising means the for displaying, in a combined way, of graphic images of plant state conditions obtained with the two control and command logical programs both the additional program and the plant simulation software.~~

Claim 19 (currently amended): ~~[[A]] The device according to claim 18, characterised in that it comprises further comprising means for displaying, inby an overlap way, plant layout~~

images according to ~~the two control and command logical programs~~ the additional program and the plant simulation software, in which wherein the overlapping of the plant state condition image highlights the possible differences are between the plant images generated by the additional program and the plant simulation software, and wherein the possible differences are graphically highlighted in a visually relevant way.

Claim 20 (currently amended): ~~[[A]] The device according to one or more of the preceding claims 15 to 19, characterised in that the~~ claim 15, wherein two different comparison modes with a virtual plant are provided in the logical engine, the two different comparison modes comprising a first comparison mode having a at the Boolean equation system and a second at comparison mode having report files of the test of control and command logical programs with the virtual plant are executed sequentially, the result of the first comparison mode being a means to identify the operating unit and/or the plant area and/or the Boolean equations plant conditions wherein a difference has been noticed and it must be subjected to the second comparison stepmode.

Claim 21 (currently amended): ~~[[A]] The device according to claim 20, characterised in that the comparison wherein a comparison relevant to plant conditions obtained by the two control and command logical programs different comparison modes is firstly executed, and therefore wherein it is identified on which parts of the program the comparison actions can be limited with regard to within the Boolean equation system, in order to determine possible where actions are possible to correct the program same or the debugging.~~

Claim 22 (currently amended): ~~[[A]] The device according to one or more of the preceding claims 15 to 21, characterised in that the Boolean checker analyses, basing claim 15, wherein the validation and certification system is capable of analyzing, based on diversity, even logical programs for simulating one or more of a the single operating units and/or the unit, a plant areas and/or area, the entire plant, and/or the and a logical programs program for simulating relays or a relay network, and wherein the validation and certification system is capable of extending such~~



~~check action~~ the analyzing, based on the diversity, ~~of the generating program~~ even to programs for graphically representing one or more of an operating units or relays unit and a relay.

Claim 23 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that it comprises~~ claim 1, further comprising a network interface, ~~wherein the device and it may constitute comprises~~ a non-vital node of the railway plant, ~~being a~~ and wherein the device further comprises means for quickly modifying the control and command logical program and for virtually validating the same, ~~for instance in case of a structural modification of the plant by eliminating or adding plant elements.~~

Claim 24 (currently amended): ~~[[A]] The device according to claim 23, characterised in that said wherein the device, alternatively or in conjunction, is~~ is capable of operating as a diagnostic or and supervisory tool of the correct proper operation of the real station plant, and wherein the device reproduces a simulated plant simulating the actual plant in a desired state condition, being provided the device further comprising a comparator between the state condition ~~that has been assumed by the real plant and the one that has been~~ state condition assumed by the simulated plant.

Claim 25 (currently amended): ~~[[A]] The device according to claims 23 or 24, characterized in that it is~~ claim 23, wherein the device for is capable of simulating emergency interventions before their ~~application applications~~ to the ~~real plant~~, and wherein in the an emergency event ~~situation being it~~ is possible to simulate several intervention ~~or and~~ command possibilities of the plant to ~~execute~~ be executed on the plant, ~~itself thereby indicating the optimal choice the~~ among the ~~possible choices the one that is the best solution~~ intervention and command possibilities.

Claim 26 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised in that it comprises~~ claim 1, further comprising tools for executing simulating functions with a user interface of the type used by ~~the Windows® program soft Inc.~~ a desired computer operating system, and therefore it comprises thereby providing an operator with operating windows ~~with having~~ function buttons, quick choice menus and other

functionalities typical of said user interface, in addition ~~obviously to the use of mouse or of other pointers~~ a pointing system, selection and command input systems, and ~~the~~ a keyboard to input numerical data, ~~such as to create or modify the operating windows~~ providing graphic images of operating units, ~~and/or of relays, or of and~~ and other parts of the plant ~~structure~~.

Claim 27 (currently amended): ~~[[A]] The device according to one or more of the preceding claims, characterised on that it provide~~ claim 1, further comprising means for setting specific operating conditions of the plant or of and anomalous situations in the plant, and further for checking the changes in operating conditions in the plant reactions referring according to several different operating environment~~environments~~.

Claim 28 (currently amended): ~~[[A]] The device according to claim 27, characterised in that wherein~~ manually setting means are means provided by the personal to an operator of the device, wherein the manually setting means impose, imposing at the starting of the cycle for executing control and command logical program signals, specific state conditions to the several plurality of operating units, wherein being possible to provide by means of suitable scheduling even conditions may be provided wherein that cause one or more of the plurality of operating units are not operating or operate in a anomalous way to operate anomalously, and wherein the one or more of the plurality of operating units operate anomalously by operating incorrectly or by failing to operate.

Claim 29 (currently amended): A method for checking a software logical engines engine for controlling and commanding ~~plants such as railway plants, particularly station plants~~ a plant, the method comprising:

using at least a central processing unit and at least a memory for loading and executing programs~~[[:]]~~;

a logical engine for commanding a the plant with a logical engine, particularly a station plant, the logical engine being loaded or loadable in said at least a memory for its the execution of the logical engine, the logical engine providing command and control signals~~[[:]]~~

receiving command signals and transmitting control signals related to the operating conditions which plant comprises of a plurality of actuating and/or detection and/or measurement and/or signalling operating units situated in the plant, the plurality of operating units being capable of actuating, detecting, measuring, and signaling; so-called wayside equipments, which units are provided for receiving command signals and transmitting control signals as regards the operating condition;

and which logical software engine reads reading with the logical engine the control signals given provided by the actuating and/or detection and/or measurement and/or signalling plurality of operating units; and

it processes processing the command signals of said plurality of operating units basing on according to an operating protocol of the system itself plant,

characterised in that

wherein in the computer memory a plant simulation software program for software simulating the plant that must be is controlled and commanded by the control and command logical program logical engine is loaded or loadable in the at least a memory, and it

wherein the plant simulation software is designed to can be executed by the computer itself at least a central processing unit, and

wherein which simulating the plant simulation software program reproduces exactly simulates accurately the plant structure and the operating modes of the plurality of operating units provided in said plant.

Claim 30 (currently amended): [[A]] The method according to claim 29, characterised in that the simulation of the plant structure and of the operating units associated thereto, such as track circuits to note the train presence, switch points actuators, signalling actuators and other different units is represented in the simulating program by wherein the plant simulation software comprises Boolean algorithms including variables, and wherein the variables

~~associated to said algorithms being~~ are univocally defined to represent control signals of ~~various state or operation~~ different state and operating conditions of ~~various~~ the plurality of operating units ~~and commutation as well as~~ command signals for commutating and maintaining the ~~different of state or~~ and operating conditions of ~~said various~~ the plurality of operating units ~~and/or the maintenance thereof.~~

Claim 31 (currently amended): ~~[[A]] The method according to~~ claims 29 or 30, ~~characterised in that the~~ claim 29, wherein an image of ~~the behaviour~~ a simulated behavior of the virtual plant under the control of the ~~control and command~~ logical engine program is displayed as variables list univocally associated to ~~various~~ the plurality of operating units as report files, and wherein ~~various~~ the plurality of operating units and ~~the associated state or~~ and command variables associated with the plurality of operating units are listed.

Claim 32 (currently amended): ~~[[A]] The method according to~~ one or more of the ~~preceding claims 29 to 31,~~ characterised in that it provides the setting by the claim 29, wherein a user is capable of setting the ~~of starting~~ operating conditions of the plant at start-up, ~~and/or even anomalous~~ and wherein the user is further capable of setting specific conditions situations of ~~plant~~ the plurality of operating units, ~~to check~~ thereby verifying the reaction of the plant to ~~these~~ the set conditions.

Claim 33 (currently amended): ~~[[A]] The method according to~~ one or more of the ~~preceding claims 29 to 32,~~ characterised in that claim 29,

wherein a virtual image of ~~the~~ one of the plurality of operating unit ~~and/or the~~ and of a plant structural element can be univocally associated to ~~each~~ the plant operating unit ~~and/or to each relevant~~ and the plant structural element,

wherein the virtual ~~which~~ image is generated by a graphic program ~~loaded or loadable~~ and/or and executable by the ~~computer~~ central processing unit, ~~and which~~ wherein the virtual image is univocally correlated to the ~~simulating logical engine;~~ program of the operating unit or of the plant structural element

wherein the graphic program for generating the virtual image of each operating unit being such to generate is capable of generating several graphic aspect conditions of graphic aspects of one or more of the plurality of operating unit units, and

wherein each of them the plurality of operating units is univocally correlated to a predetermined value of variables a variable relative to the operating condition of the operating unit and/or commutation or maintenance command and of a variable variables related to of the operating state of the operating unit itself.

Claim 34 (currently amended): ~~[[A]] The method according to claim 33, characterised in that~~ wherein the operation of the control and command logical program engine is further capable of being represented in parallel or alternatively and in the alternate as behaviour of the equivalent command hardware logic composed of a relay network, and wherein being provided a simulating program of relays relay operation and a simulating program of relay network operation are provided, as well as graphic programs for representing relays univocally associated to each the relay simulation program and the relay network graphic representation program.

Claim 35 (currently amended): ~~[[A]] The method according to claim 34, characterised in that~~ wherein the plant comprises relays that are capable of receiving commutation commands, wherein each relay is simulated by a Boolean logical program of Boolean type, wherein individual state conditions of the relays and/or and of the commutation commands being are represented by state or and command variables, and wherein graphic programs being such to associate several different graphic aspect aspects of the relays univocally correlated to with values assumed by said state or and command variables.

Claim 36 (currently amended): ~~[[A]] The method according to one or more of the preceding claims, characterised in that~~ claim 34, further comprising the step of displaying the display of the functional behaviour behavior of the plant, wherein the display of the functional behavior of the plant is executed according to two modes, the two modes comprising a first mode having and i.e. in the shape of a report file that displays values of state variables generated by the programs processed by the plant simulation software logical programs of operating units,

and a second mode having in the shape of a graphic representation of the operating condition of plurality of operating units, thereby enabling a user allowing to check in details detail the plurality of operating units, of the plant and therefore the physical operation modes thereof both in an analytic way and in a direct visual way of the physical operation condition.

Claim 37 (currently amended): ~~[[A]] The method according to one or more of the preceding claims, characterised on that it provide means for~~ claim 36, further comprising the capability of setting specific operating conditions of the plant, or of anomalous situations in the plant, and for checking the plant reactions referring according to several operating environment.

Claim 38 (currently amended): ~~[[A]] The method according to claim 37, characterised in that settings can be executed by the personal imposing wherein the capability of setting can be implemented at the starting a specific step of the plant simulation softare, the cycle for executing the control and command logical program specific state conditions to the several operating units, being wherein it is possible to provide by means of by a suitable scheduling even conditions wherein one or more the plurality of operating units are not operating or operate in a anomalous way operating anomalously, and wherein the one or more of the plurality of operating units operate anomalously by operating incorrectly or by failing to operate.~~

Claim 39 (currently amended): ~~[[A]] The method according to claim 37, characterised in that it provides the further comprising the step of scheduling and the configuration- configuring of images and/or and state and command variables of virtual operating units corresponding to the desired or correct operation or operational and state condition-conditions of the plant in conjunction with and a predetermined situation of operation, and the step of executing a the execution of the direct and visual check of correct operation as well as the execution of and an automatic check based on the comparison between the a nominal image and a the nominal table or list of desired state and command variables, previously scheduled and the image and state and command variables really processed during the operation of the control and command logic logical engine with the station plant virtual model, an error message being sent in case of non-identity.~~

Claim 40 (currently amended): ~~[[A]] The method according to claim 39, characterised in that wherein the automatic check provides is capable of providing a graphic and/or and analyticalanalytic display of the operating unit that has assumed a non-correct condition, and of providing the corresponding state or and command variable or variables, and the and/or graphic and/or and analytic display of state variables of the simulated relay network-simulated.~~

Claim 41 (currently amended): ~~[[A]] The method according to one or more of the preceding claims 9 to 40, characterised in that it provides claim 39, further comprising the step of providing automatic tools for correcting the control and command logical program depending on logical engine according to possible corrections made by the user to the state or and command variables, the state and command variables being manually modified in the presence because of a state or and command error of one or more of a virtual operating unit or and of a relay in the corresponding command logic circuit constituted by within a virtual model of the relay network virtual model.~~

Claim 42 (currently amended): ~~[[A]] The method according to claim 41, characterised in that it provides the execution of wherein modification interventions both of alphanumeric type can be executed both of alphanumeric type on report files of state or and command variables, or and of graphic interventions for modifying the aspect of type on the operating unit or of and the relay, the graphic interventions corresponding corresponding to the state of said operating unit or and of said relay, said data being interpreted said alphanumeric and graphic interventions being performed by a correction program that analyses-analyzes state or and command variables values that are manually set to correct those wrongundesired values, and that further analyzes-analyses the control and command logical program- the logical engine and modifies the colour logical engine's code to commutate commute the operating unit or and the relay in to the correct-desired state conditionsecondition-with the same operation- when an operating condition occurs in presence of due to which the control and command logical program- logical engine had previously-generated thean error.~~

Claim 43 (currently amended): ~~[[A]] The method according to one or more of the preceding claims, characterised in that it provides~~ claim 39, further comprising the step of providing a Boolean simulation program simulating plant operations, wherein the read in of areas of the virtual station simulated plant operations and the corresponding parts of the control and command logical program having logical engine comprise typical plant structures that recur in various several station plants, so to be able to load and reuse both the Boolean simulation programs program, and a related graphic display programs program, as well as and parts of the control and command logical program engine in new station plants having equal station areas operations.

Claim 44 (currently amended): ~~[[A]] The method according to one or more of the preceding claims, characterised in that it provides~~ claim 39, further comprising the step of providing the an alternative or and a parallel execution of a check of the command and control logical program engine during the a test step with the plant simulator simulation software, wherein the alternative and the parallel execution comprise by means of using a Boolean checker that generates with diversity principles, or wherein is memorized, employs a control and command logical program generated with diversity principles and that compares the control and command logical engine program during the test step by means of virtual plant simulation with the one command and control logical program generated with diversity criterions principles.

Claim 45 (currently amended): ~~[[A]] The method according to claim 44, characterised in that it provides a further program for~~ further comprising the step of providing an additional program for generating the control and command instructions program object of related to the test step, by means of plant simulation, which generating wherein the additional program operates according to a code different from that with which has been generated the control and command logical program during the test by means of virtual plant of the plant simulation software, wherein the two control and command logical programs additional program and the plant simulation software each comprise a Boolean equation system, and wherein the additional program and the plant simulation software are being compared by the Boolean checker to identify difference in the Boolean equation system systems.



Claim 46 (currently amended): ~~[[A]] The method according to claim 44, characterised in that in addition or alternatively 45, wherein the control and command logical program generate by the checker or memorized therein is subjected to a the test step by means of using a virtual plant, being compared and wherein the results obtained by the two control and command logical programs program and the plant simulation software are compared.~~

Claim 47 (currently amended): ~~[[A]] The method according to one or more of claims 44 to 46, characterised in that it provides the claim 46, further comprising the capability of providing a display, both in the shape of comparative tables of variables and in the shape of graphic comparisons, of the operation operational differences of between the two control and command logical programs program and the plant simulation software, the operational differences being generated according to diversity criterions, and/or and of operational differences between the two relay networks corresponding that correspond to the two Boolean equation systems, being highlighted the variables and the graphic states comparisons respectively being highlighted that which are different one with respect to the other both in within the comparative tables variable comparison and in within the graphic comparison comparisons.~~

Claim 48 (currently amended): ~~[[A]] The method according to claim 47, characterised in that it provides the further comprising the step of providing an overlap of graphic images of the plant state conditions obtained by the two control and command logical programs program and by the plant simulation software, being graphically highlighted the possible differences in this the overlap of the graphic images image of the plant state condition being graphically highlighted.~~

Claim 49 (currently amended): ~~[[A]] The method according to one or more of claims 44 to 48, characterised in that it provide the execution claim 48, wherein the two modes for displaying the functional behavior of the plant can be executed in alternative or and in sequence turn of the two modes for comparing, wherein the two control and command logical programs program and the plant simulation software are compared at the Boolean equation system level and at the~~

result of the test ~~execution on the simulated virtual plant step, and wherein being also possible to modify the sequence order of the two different comparison modes~~ is capable of modification.

Claim 50 (currently amended): ~~[[A]] The method according to claim 49, characterised in that it provides the following comparison steps wherein the control and command logical program and the plant simulation software are compared with comparison steps comprising:~~

~~Firstly executing the a first comparison in relation to the plant conditions obtained by the two control and command logical programs~~ program and the plant simulation software;

~~Basing on said comparison identifying, in the basis of the first comparison, on which parts of the control and command logical program and of the plant simulation software the subsequent comparison actions can be limited;~~

~~Executing the executing a second comparison in relation to the Boolean equations of the two control and command logical programs~~ program and of the plant simulation software, only for the second comparison being limited to the equations that caused the functional divergences that have been were found in the first comparison step;

~~therefore executing the possible correction corrective actions thereof or the debugging inquires (and error detection) detections on said the Boolean equations identified as responsible for the different behaviour divergent behavior of the plant.~~

Claim 51 (currently amended): ~~[[A]] The method according to one or more of the preceding claims 44 to 50, characterised in that claim 50, wherein the actions for the comparison the first and second comparisons are executed with a program generated according to a different generating code, wherein the capability is provided of executing additional comparison steps are executed also in relation to logical programs for related to the simulation and the graphic representation of simulating the individual operating units, and the plant structure, as well as at logical programs for simulating and the relays and the relay network and~~

~~in case such check action may be also extended to the graphic representation programs of the operating units or of relays.~~

Claim 52 (currently amended): ~~[[A]] The method according to one or more of the preceding claims 44 to 51, characterised in that it comprises claim 50, further comprising the step of certifying the plant simulation software with parallel means, for certifying the control and command logical program consisting in the parallel means comprising an additional a further independent program that executes in parallel the test of the same-Booleans equation system constituting the control and command logical comprised in the plant simulation program software, to execute thereby executing a double test by means of the railway performing a plant simulation, the behaviour- behavior of the simulated plant obtained under the control of the control and command logical- with the plant simulation program software in the two separated and parallel check tests test steps being compared, and one or more of alert and or error files being generated in case of a discrepancy difference.~~

Claim 53 (currently amended): ~~[[A]] The method according to one or more of the preceding claims 44 to 52, characterised in that it comprises a claim 45, further comprising the step for of creating an operating connection to devices remote operating units or- and remote networks, so to be able to command the test functions form- from a remote workstation and/or and to execute alternative functions as functions of a non vital node of railway the plant.~~

Claim 54 (currently amended): ~~[[A]] The method according to claim 53, characterised in that it is used- further comprising the step of for a modification to update updating the plant simulation software a control and command logical program and for the virtual functional test thereof the test steps in case of a structural modification of the plant.~~

Claim 55 (currently amended): ~~[[A]] The method according to claims 51 to 54, characterised in that it is used- claim 53, further comprising the step for the supervision or the diagnostic of supervising and diagnosing the correct operation of the real station plant[[,]] by executing a comparison between the state condition- conditions assumed by the real plant and that- the state conditions assumed by the simulated plant.~~

Claim 56 (currently amended): ~~[[A]] The method according to one or more of the preceding claims 50 to 55, characterised in that it is used~~ claim 53, further comprising the step of simulating as a virtual emergency simulator for intervention or ~~and~~ command possibility of the real on the plant, to thereby implementing realize on the plant itself only the choice that offers the best optimal solution under an emergency condition among the possible choices.

Claim 57 (currently amended): ~~[[A]] The method according to one or more of the preceding claims 29 to 55, characterised in that it comprises a program for claim 29, further comprising the step of executing simulation functions with an user interface of the type used by Windows® program by Microsoft Inc. an operating system displaying and hence comprising operating windows with function buttons, quick choice menus and other functionalities typical of said interface within the operating windows, in addition obviously to the use of the mouse or further comprising the capability of using of other pointing means, selection and inputting of commands and the a keyboard to input numerical, alphanumerical data, and/or and numerical or and alphanumerical commands, such as also thereby creating and modifying to create or modify graphic images of operating units, and/or of relays, or of and other parts of the plant structure.~~

Claim 58 (currently amended): A computer-readable medium of instructions program for a computer, the computer-readable medium of instructions being capable of verifying provided to verify a logical program for controlling and commanding a plant, particularly railway plant by the computer-readable medium of instructions further having application means of application on a simulated railway plan plant, the computer-readable medium of instructions comprising: that is provided to execute the method steps according to one or more of the preceding claims 29 to 57 or to be loaded in the computer to form a device according one or more of the preceding claims 1 to 28.

at least a central processing unit and at least a memory for loading and executing programs[[:]];

means for commanding the plant with a logical engine, the logical engine being loadable in the at least a memory for the execution of the logical engine, the logical engine further providing command and control signals;

means for receiving command signals and transmitting control signals related to the operating condition of a plurality of operating units situated in the plant, the plurality of operating units being capable of actuating, detecting, measuring, and signaling;

means for reading with the logical engine the control signals provided by the plurality of operating units; and

means for processing the command signals of the plurality of operating units according to an operating protocol of the plant,

wherein a plant simulation software that is controlled and commanded by the logical engine is loadable in the at least a memory,

wherein the plant simulation software is capable of being executed by the at least a central processing unit, and

wherein the plant simulation software simulates accurately the plant structure and the operating modes of the plurality of operating units provided in the plant.